

BELIZE

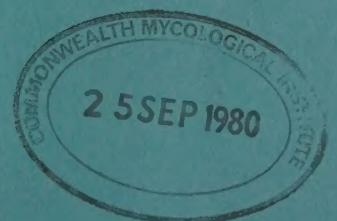
Ministry of Agriculture and Lands

Department of Agriculture

ANNUAL REPORT

1976

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Printed by the Government Printery

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ANNUAL REPORT OF
THE
DEPARTMENT OF AGRICULTURE
1976

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1.1 Weather Conditions

Generally weather conditions in 1976 were more conducive to crop and livestock production than were the droughty conditions experienced in 1975.

For the most part, rainfall patterns were adequate though sometimes excessive light showers of rain fell in all areas of the country in January and February, and conditions were favourable to the offseason production and harvesting of corn, red kidney beans and sorghum. The months of March and April were generally hot and dry with only light scattered showers occurring in some areas. Conditions for land preparation practices and harvesting were favourable. However, there was a deteriorating effect on pastures, and in April pasture productivity was markedly reduced.

In May the dry season was broken by intermittent rains, and by June and early July excessive rainfall resulted in flooding of rivers throughout the country of Belize. Flooding caused damages to many fields on the river banks and other low lying areas. In June almost all areas had rainfall in excess of 16-20 inches. August was predominantly dry in the North and weather conditions were conducive to replanting of corn as well as the establishment of sugar cane and improved pastures. However, in Toledo, heavy rainfall delayed harvesting of milpa rice and corn. Early September saw heavy rains in most areas, but later September, October and early November were generally dry and sunny, favouring harvesting of rice and corn, as well as land preparation of the main R.K. beans crop. Heavy rains were experienced in most areas in December and rivers in Belize and Stann Creek districts flooded. Early planted bean fields in low lying areas were damaged. In Toledo frequent rains delayed harvesting of the R.K. beans seed crop, resulting in the germination of about 50% of the seeds in the pod.

January, February, November and December were the coolest months, March to July were the hottest.

Monthly figures for rainfall, average minimum temperatures, average maximum temperatures and average Relative Humidity at various stations are recorded in appendices I, II, III, IV.

1.2 Export Crops

1.2.1 Sugar Cane

The 1976 sugar cane crop commenced on 29th January, almost a month late. This was due to the slow growth of the cane plants - a direct result of the 1975 drought.

In Corozal 24,000 acres were planted to sugar cane and in Orange Walk 25,000 acres, a total of 49,000 acres. An estimated 35,000 acres were harvested. Production of sugar decreased from 82,874 long tons in 1975 to 61,699 long tons in 1976. The low levels of production were due to a combination of factors including two hurricanes in late 1974, an unusually severe drought in 1975, the incidence of army worms in cane fields and the advent of heavy rains in June, 1976.

Extremely wet conditions brought to a close the grinding operations at Tower Hill Factory after it had operated for 126 days and produced 30,634 tons of sugar and 10,594 tons of molasses from 303,069 tons of cane. The average tons cane/ton. sugar ratio was 9.89. Libertad's Factory ceased operations on August 6th and 30,643 tons of sugar and 9,691 tons of molasses were produced from 292,328 tons of cane. The average tons cane/ton. sugar ratio was 9.57, and for both factories the overall ratio was 9.76. For comparative sugar production statistics 1975 and 1976 see Table 1.

Table I: Comparative Sugar Production Statistics for 1975 and 1976.

Factory	Tons Cane Ground		Sugar Produced (tons)		Molasses Produced (tons)	
	1975	1976	1975	1976	1975	1976
Tower Hill	418,670	303,067	42,400	30,193	15,485	10,594
Libertad	364,448	303,953	40,474	31,506	12,585	10,155
	783,118	607,022	82,874	61,699	28,068	20,749

Sugar exports in 1976 consisted of 55,705 long tons, of this 12,535 long tons was exported to the U.S.A. and 43,170 long tons to the U.K. Molasses export to the U.S.A. amounted to 22,898 tons. Exports of sugar and molasses together contributed \$36.5 million in foreign exchange to the country's economy.

The final price paid to cane delivered in 1976 was \$40.12 per ton to Corozal farmers, and \$38.84 per ton to Orange Walk farmers. Total earnings to cane farmers for the sugar cane crop in 1976 was approximately \$23.5 million, as compared with 1974/1975 when \$47 million was paid to cane farmers.

The Corozal branch of the Cane Farmers Association received approval of a loan of \$500,000 from DFC for on-lending to its members at an 8 1/2% annual interest rate. The loan will enable small farmers to rehabilitate cane fields damaged by hurricane in 1974 and drought in 1975.

Construction of sugar roads commenced in May. The work was financed with a loan from the Caribbean Development Bank. The Belize Cane Farmers Association sent a delegation of 20 members to the 15th Annual Conference of Caribbean Cane Farmers Association held in Barbados 23rd to 27th August.

Finally, the annual sugar cane survey initiated through joint efforts of Belize Sugar Board, Belize Cane Farmers Association, Belize Sugar Industries Ltd, and the Ministry of Agriculture; preliminary results indicate the availability of around 600,000 tons of cane in each of the two districts.

1.22 Citrus

Citrus production declined from 1.3 million field boxes in 1974/1975 to just over 1 million boxes in the 1975/1976 crop, a drop of approximately 23 percent. Of the 10,000 acres planted to citrus in the 1975/76 crop 7,300 acres were in oranges and 2,700 in grapefruit. Orange production was 802,160 contract boxes (approximately 90 lbs. each). The Citrus Company of Belize Ltd. bought and processed 42.3% of the orange crop and Salada Belize Ltd. 57.7%. The 1975/76 grapefruit crop was 407,060 contract boxes (80 lbs net each) of which the Citrus Company bought and processed 63.7% and Salada 36.3%.

The Citrus Company of Belize Ltd bought grapefruit for three (3) export shipments as fresh fruit at an advance price of \$2.10 per contract boxes and 75¢ per box for rejects. Growers received a further 23¢/box as a second payment. Both companies bought plucked fruit for processing as frozen concentrate. The Citrus Company of Belize also processed into sections and juices. Prices paid was \$1.25 advance per contract box.

As in 1973/74 both early and late oranges were bought at the same price, both processing plant paid an advance price of \$1.45 per contract box.

The citrus growers Association had a total membership of 331 growers in 1976. The Association held its 8th Annual General Meeting in September, 1975. A cess of 7¢ per contract box of fruit delivered was levied by the Association in order to obtain funds to cover its operational expenses.

Exports of citrus products were valued at about \$6 million in 1976.

1.23 Bananas

Banana made its re-entry as an export crop in 1976 after set-backs by hurricane in 1974 and drought in 1975. Exports amounted to 357,976 boxes (42 lbs net each) from the Cowpen banana growing area of Stann Creek, and were valued at \$1,895,887.

1.24 Honey

A record production of honey was achieved in 1976 with a total production of 655,000 lbs of honey. Honey extraction continued all through the year with only minor set-backs here and there. In June, 29 colonies of bees were lost in Orange Walk and Corozal Districts because of flooding. In July a slight infection of American Fowl Brood was diagnosed in an apiary in the Cayo District. Measures were taken to contain the spread of the disease. The main pest problem in the apiaries were primarily the wax moth, and to a lesser extent the Marching Army Ants. These were controlled with Paradichlorolenzene for the former, and the use of burnt oil around the hives in the case of the ants. On a whole pests and diseases were not of major importance for the year 1976.

The distribution of apiaries, hives, beekeepers and production levels at 31st December follows in Table 2.

Table 2:

<u>District</u>	<u>No. of Apiaries</u>	<u>No. of Hives</u>	<u>No. of Keepers</u>	<u>Honey Prod.</u>
Orange Walk	120	2,730	82	327,842
Corozal	65	1,925	40	215,552
Belize	35	353	30	12,824
Cayo	43	989	35	69,300
Stann Creek	1	8	1	--
Toledo	52	700	52	29,500
	316	6,705	240	655,018

Production continues to be greatest in Orange Walk and Corozal but 1976 has also seen a significant increase in the numbers of hives in Toledo, a rise of 463 hives, and the initiation of beekeeping in Stann Creek.

A total of 442,200 lbs of honey was exported to the U.K. valued at \$292,000 Bze. The export price was \$1,480 per long ton F.O.B. Belize.

Papaya

In Shipyard, the Papaya factory ~~diced~~ and dehydrated 194,859 lbs of green papaya for the 1976 crop. The green papaya was purchased at 2 1/2¢ per lb from farmers of the Shipyard Community. The acreage cultivated per farmer ranged from 1/2 to 5 acres. In 1976, 30 farmers were involved in production.

Total exports to a Canadian Market amounted to 10,000 lbs at a price of \$1.40/lb. Prices were considered low.

12.6 Mangoes

The year 1976 was bad for mangoes following the 8 months drought of 1975. Trees did not set new leaves until May/June.- the usual commencement of the harvest.

Production for 1975 was 1,500 tons and in 1976 250 tons. Most of the trees in production should reach maturity by 1980 when estimated production will be 10,000 tons per annum.

1.3: Food Crops

Rice

In 1976, total areas cultivated to paddy rice was approximately 10,957 acres from which an estimated 13.8 million lbs paddy was harvested. This represented a 25% increase in production over 1975. Big Falls Ranch double-

cropped, irrigated 5,408 acres and produced 7.8 million lbs paddy. Toledo farmers accounted for most of the 6.0 million lbs paddy produced by local farms. See Table 3. Apart from Big Falls Ranch 471 acres of rice were mechanically cultivated, 451 acres in Toledo and 20 in the Belize District.

Table 3: Total area planted to rice (not including Big Falls Ranch)

<u>District</u>	<u>Acreage</u>	<u>Production Estimate</u>
Corozal	205	200,000
Orange Walk	651	650,000
Belize	357	270,000
Cayo	280	300,000
Stann Creek	100	100,000
Toledo	<u>3,956</u>	<u>4,400,000</u>
	5,549	5,960,000

There was no major rice diseases or insect problems in 1976. A minor setback of army worms (*Spodoptera frugiperda*) was reported in Toledo District. Rice Blast and Brown Leaf spot was also evident in some fields in Toledo but at levels insufficient to warrant treatment. Bird damage on the crop was severe in Belize and Cayo Districts.

The Marketing Board purchased 2,469,768 lbs paddy of which 1,926,517 lbs were transferred for milling. This yielded 1,219,248 lbs of milled rice for the local market. Guaranteed prices paid by the Board remained at \$.14/lb. Big Falls Ranch produced 4,900,000 lbs milled rice.

The approximate value of the 1976 rice crop to the producers were \$2.2 million.

1.32 Maize

The area planted to maize in 1976 was 31,055 acres yielding an estimated 40 million lbs of dried grain. Maize production in 1975 was 26 million lbs.

Table 4: Acreage planted to Corn and production level per District.

<u>District</u>	<u>Acreage</u>	<u>Estimated Production (lbs)</u>
Corozal	3,420	4,200,000
Orange Walk	12,900	18,045,000
Belize	900	910,000
Cayo	7,300	10,225,000
Stann Creek	750	750,000
Toledo	<u>5,785</u>	<u>5,870,000</u>
	31,055	40,000,000

Most of the corn crop was manually cultivated, especially in Belize, Stann Creek and Toledo under the 'milpa system'. The mennonites in the Cayo and Orange Walk Districts accounted for the main portion of mechanized maize production. Yields varied tremendously from 600-800 lbs/acre in Belize district, to 1,500 lbs/acre in Cayo, Corozal and Toledo, to 2,000 lbs/acre in Orange Walk.

The off-season crop was harvested in March and the main crop was planted in May/June. Flooding, resulting from heavy rains in June, accounted for a loss of 405 acres in Belize District and 500 acres in Corozal, and damage to several low lying fields in other districts. In almost all cases replanting was done in July.

Seeds of the synthetic variety VS550 was available from the Department

of Agriculture, and of the hybrid varieties. Pioneer X304B and X306B, from the Mennonite Centres and Marketing Board depots.

In Belize and Cayo Districts bird damages were extensive, Armyworms (Spodoptera Frugiperda) attacked the crop in Cayo and Toledo. Also in Toledo the Stem borer (Diatrea sp) and beetles (sito Hilus) damaged the corn crop.

A total of 588,550 lbs of corn was purchased by the Marketing Board at \$15/lb. The approximate value of the 1976 crop to the producers was \$5.75 million.

1.33 Red Kidney Beans

The total area planted to the 1975/76 R.K. beans crop was 4,700 acres from which an estimate of 2.4 million lbs of dried Beans were harvested. This represents a fall in production of 12.7% over 1974/75. Yields were low in Stann Creek where the crop was under fungal and insect attack. In Corozal, Orange Walk and Belize Districts yields of up to 800 lbs/acre were obtained. In Toledo excessive rains in the latter part of the year caused extensive damages to the early planted R.K. (beans-seed) crop.

The Marketing Board purchased 449,713 lbs of R.K. beans at \$.45/lb, an increase on \$.08 over the previous year.

1.4 Other Food Crops

Root Crops

Total acreage planted to root crops, including cassava, coco, sweet potato, yams and yampie was 604 acres. Cultivation was mainly on a small scale and usually inter cropped with corn and R.K. beans. Total acreage to these crops is as follows:

Sweet Potatoes	189 acres
Coco	178 acres
Cassava	158 acres
Yams & Yampie	<u>79 acres</u>
	604 acres

For the most part root crops, especially sweet potatoes and coco were always available in municipal markets.

1.42 Bananas and Plantains (Small Farmers)

Severe drought in 1975 rendered the plantain crops scarce in the early part of 1976 especially in the Cayo and Belize Districts. Bananas were supplied from the banana project in Cowpen. By May, however, adequate amounts of both crops were available and supply was adequate throughout the rest of the year. The total area planted to these crops were 833 acres.

1.43 Vegetables

The supply of vegetables especially cabbage and tomatoes were abundant from local producers from January to April. However, from May onwards supplies had to be augmented by imports of vegetables from Mexico with a concomitant rise in prices.

Table 4: Vegetables Imported in 1976 (lbs)

Irish Potatoes	552,646
Tomatoes	60,219
Onion	412,130
Garlic	5,716

Cabbage	124,526
Other Fresh Veg.	63,375
	<u>1,218,612</u>

1.44 Watermelons

A total of 195 acres were planted to watermelons in the Corozal, Orange Walk and Cayo Districts for the 1976 crop. In Orange Walk 140 acres cultivated yielded 290,000 lbs.

1.45 Tobacco

A total of 62 acres were planted to tobacco in 1976. The the Cayo District Caribbean Tobacco Company cultivated 40 acres of flue cured tobacco and 22 acres were cultivated in the Belize district. A total of 75 acres of land was cleared in Bermudian Landing for tobacco cultivation.

1.46 Soya Beans

50 acres of soyabeans were cultivated at Spanish Lookout on a commercial basis. Yields were reported to be low and the combine harvester was unable to pick up the whole crop, the pods being low on the stem.

1.47 Peanuts

A total of 105 acres of peanuts were cultivated by the Mennonites at Blue Creek and Shipyard in Orange Walk. Yields obtained were not as good as anticipated. It was sold at \$.60/lb on the domestic market.

1.48 Black Beans

The approximate acreage planted to Black Beans in 1976 was 585 acres. In Cayo 200 acres were mechanically cultivated using a bush type variety, and 50 acres were planted traditionally using a twining variety. Orange Walk and Corozal accounted for remaining 385 acres. Most of the crop was exported to Guatemala due to the limited local markets.

1.49 Broom Corn

A total of 27 acres of Broom Corn was planted by Novello Bros. of Cayo District. Yields were reportedly good, and the straw utilized to manufacture brooms.

Grain Sorghum

A total of 1280 acres were planted to sorghum in the Belize, Orange Walk and Cayo districts. Yields varied averaging just under 1600 lb/acre in Cayo and were much lower in Belize district due to bird damage.

Fruit Trees

Fruits such as mangoes, citrus, papaya, craboo, soursop, pineapple, plums etc. were grown for the domestic market usually on small holdings. In Corozal and Orange Walk excess avocado was sold in Belize City, and to local traders for export to Mexico.

1.5 The Livestock Industry

Cattle

The national cattle herd was estimated at 48,900 head

(1976), in 1975 over 500 head of cattle died as a result of the drought, but conditions for livestock development was improved in 1976.

Beef production continued to be emphasized in the industry, however, advances were made towards the continuous development of the dairy industry. An important step was the setting up of the artificial insemination Centre at Central Farm in 1976. Services were also made available to the farmers though few farmers actually responded. It is anticipated that with time, exposure and expansion of the services, farmers will eventually fully utilize, where available, this invaluable means of improving their stock and consequently the nation's stock.

The production of fresh beef in 1976 was approximately 2,078,857 lbs obtained by slaughtering some 6,112 head of cattle. Western Diaries Ltd. of Spanish Lookout continued to supply pasturized milk to the Belize District and Belmopan market. McCrea Farm in Cayo District also milked some 40 cows daily and produced 300 lbs of cheese fortnightly.

Exports of 100,000 lbs beef to Martinique were valued at \$84,123. Imports of dairy products for 1976 follows:

Milk and Cream (Sweetened and Unsweetened)	1,110,350
Milk (liquid and semi-solid)	2,241,543
Milk (Solid)	2,454,381
Butter	1,037,460
Cheese and Curd	4,580,777
Butterfat	10,874
	1,111,435,385

For the first two months of 1976 cattle were reported in good condition. In most areas, except the north, pasture growth was good. In March and April pastures began to dry up and hence their carrying capacities were reduced. Pasture had to be supplemented, and molasses and cane tops were fed in the North, and chopped sorghum and sugarcane in Central Farm.

Cattle lost weight, but this was quickly regained with the onset of rains in May and the effect it had on pasture regrowth. For the remainder of the year pasture growth was good and adequate to support the herd when optimally stocked. Towards December, and with the upcoming dry season imminent, extension officers advised farmers to cull unproductive stock in an effort to avoid overstocking in the dry. Farmers were also frequently advised on deworming, and vaccinating their herd against Blackleg.

In the North some farmers purchased Brahman and Red Poll animals from the Government's herd to improve their stock. A few farmers have acquired dairy type cattle in the Corozal District and interest was growing. In all districts there was expansion and improvement of pasture lands. The Northern districts however were more active in increasing areas of improved species. Grasses used included Carib, Guinea, Buffel, Bermuda, Jaragua and Pangola.

Pigs

The national swine population was estimated at 18,000 head in 1976, sufficient to meet the domestic demand for fresh pork as well as supplying a limited amount for export as slaughter stock to Mexico. A total of 4,163 pigs were slaughtered in 1976 giving 371,217 lbs of dressed pork. Exports of live pigs amounted to 415 heads valued at \$79,600 Dze. Exports were limited to animals over 225 lbs liveweight, and an export tax of \$30 per head was levied.

A large percentage of pig production continues on a small scale using local unimproved breeds in a free range system. The two major limitations to the expansion of the industry were the lack of high quality breeding stock and the high cost of imported concentrate feed. The demand for improved breeder and feeder stocks were high and it is anticipated that with the establishment of the new Government piggery at Yo Creek, stocks of better quality will be

more readily available. The new piggery is near completion. For a large part of the year corn was scarce and farmers fed pigs a range of alternate feeds including wastes from poultry processing plants, brewery and from abattoir, boiled root crops, plantains, bananas and wheat middlings.

Most processed and salted porcine products were imported and were valued at \$632,190 in 1976.

Poultry

Poultry production, both broiler and layer were on the increase in 1976. The increase in controlled prices of eggs to \$1.90 per dozen resulted in a steady flow of new farmers and expansion of existing farms in the layer industry. However, 308,382 dozen eggs were still imported at a value of \$442,232 Bze.

In the broiler industry, there was always an adequate supply of meat for the local market in 1976. All over the country there was expansion in the broiler production, from small backyard flocks to flocks of over 3,000 birds (Belize district). In the Cayo District there were several enterprises containing 200 to 1,000 birds. In Toledo, one farmer started with a flock of 1,000 but had to reduce output to 500/2wks due to low market demand. An oversupply of birds in Orange Walk resulted in a temporary drop in prices in October. Prices for the year ranged from \$1.20 to \$1.65 per lb. dress weight.

High cost of concentrate feed was the major limiting factor to expansion, however the good 1976 corn crop did much for boosting production. The Mennonites continue to be the main supplier of eggs and poultry in 1976.

Poultry exports amounted to about \$38,369 Bze.

1.6 Animal Health

The year 1976 saw several outbreaks of some reportable diseases. Early January, rabies was diagnosed in some dogs in the Cayo District; a vaccination campaign was quickly initiated and no more cases were reported for the year. One rabid dog was found in Belize District in September and a vaccination programme was initiated. By year's end over a third of the dog population were vaccinated.

In January, there was a confirmed outbreak of Classical Swine Fever (Swine Fever) in the Aguacate village in Toledo. Immediate measures were taken to prevent movement of pigs from this area, and personnel of the Ministry of Agriculture kept the area under daily surveillance. Up to March 45 pigs had died, but the disease was brought under control and the quarantine lifted in April.

An alleged outbreak of Vesicular Stomatitis in the Stann Creek District proved to be oral lesion caused from eating the plant Laurentia longiflora. Samples were sent to AFTOSA, Brazil but all samples were negative.

There were outbreaks of Blackleg both in the Orange Walk and Cayo District in 1976. Several animals died and animals on infected and neighbouring farms were vaccinated. One animal was suspected with Vibriosis in the Cayo District, and 500 animals were vaccinated against this disease.

Occasional cases of diarrhoea in cattle were attributed to the consumption of fresh green grass. Seven cases of abortion in cattle in Toledo were attributed to malnutrition.

The poultry industry also had its fair share of diseases in 1976. There were confirmed outbreaks of Fowl Typhoid in Belize and Toledo, also outbreaks of Fowl Pox in Toledo, and in Stann Creek 100 birds died from Fowl Pox and Coliform infections. One case each of Epidemic tremor and Fowl Paralysis was confirmed at the Belize Vet Lab.

Post Mortem examinations at the Slaughter house found several pigs affected with Cysticercosis, and all carcasses were condemned. Liver fluke was also found in 2 heads of cattle and 2 sheep.

All in all, the major health problem in all livestock classes continued to be both internal and external parasites.

2.0 Work of the Department of Agriculture

2.1 Policies

The basic policies of the Department of Agriculture are:

- (1) Conducting adaptive research on crops and livestock of economic importance.
- (2) Disseminating the results of research efforts to farmers through the extension services.
- (3) Encouraging farmers to adopt modern techniques of production so as to increase their output, and to use improved varieties of crop and improved breeds of livestock.
- (4) Promoting mechanized farming by the provision of mechanical services to farmers at attractive rates.
- (5) Increased production of crops and livestock products so as to achieve self-sufficiency in the basic foodstuffs, and develop export surpluses of those products in which the country has comparative advantage.

2.2 Report of the Agronomy Section

The Agronomy Section devoted its time to the improvement of cultural practices in grains, corn, rice and beans at the farmer's level; applied research to improve the milpa system; varietal research to screen the most promising varieties of corn and soyabeans; a program of seed supplies with emphasis on open-pollinated varieties of corn and a reliable source of bean seed.

Improvement in Cultural Practices

The improvement of cultural practices at the farmer level, in the form of expanded acreage, increased mechanization and improved technology resulted in a surplus of 7 million lbs of corn. Rice production (1976) was also about 2 million lbs higher than in 1975. Weeds remained the main factor affecting rice productivity and weed control was recommended in both mechanized and milpa cultivation. In the 1976/77 bean season there was a drive to grow more R.K. beans in an attempt at self-sufficiency.

Applied Research to Improved the Milpa System

Corn - Toledo

Work done shows that the improved variety VS550 yielded higher than the traditional variety. Under similar growing conditions. The main disadvantage, non-acceptance by the farmers was because of its higher susceptibility to weevils. Weevil attack could be reduced with prompt harvesting.

Chemical weed control increased the yield of good ears of VS550 by 130% and 98% in the San Pedro Columbia and Mafredi sites respectively.

For a variety to be acceptable to the Toledo Milpero it must be highly tolerant to weevil as well as high yielding.

Rice - Belize

Applied research on rice was conducted on three sites previously possessing:-

1. High, dense vegetation.
2. Medium vegetation (cleared previously by hand and left 5 years for regrowth).
3. Low vegetation (recently cropped).

The traditional system of cultivation uses a tall variety, e.g. Blue Bonnet 50, wide spacing and manual weed control. The land is used once then abandoned and all operations, including land preparation, are manual.

Yields of rice from virgin land (high vegetation) can be increased 32% by changing to a semi-dwarf, high yielding variety such as CICA4. Yields of CICA4 with high planting densities were 64% higher than with traditional spacings on virgin land. Yield of rice grown on soil recently cropped (low vegetation) can be increased by 78% by increasing the plant density, using CICA4, and chemical weed control.

Urea application had no significant increases yield/at any of the three sites.

Varietal Testing

Corn

Two trials, testing corn varieties were completed (in coordination with CIMMYT). Data was submitted to CIMMYT for statistical analysis.

From averages of 4 replicates promising varieties were, for the first trial, H 510 (INIA Mexico), Guaymas (Honduras), T-31 (Poey), TICO V-1 (Costa Rica), B-660 (DeKalb), HD-105 (Honduras), HA-502 (Honduras), X-105 (Pioneer) H-5 (Salvador); and for the second trial, X-306 (Pioneer), H-510, TC-41 (Poey), Sintetico Amarillo 6 times (Guatemala), NK 991 (N.K.), H-S (Semillas) S.A., El Salvador, X-304A (Pioneer), H-101 (Salvador), B660 (De Kalb).

The first trial was on a clay soil and the second on an alluvial soil.

Newly Introduced Varieties

Open pollinated varieties of corn, Mezcla Amarilla and Amarillo Dentado were bulked for introduction to farmer's in 1977. Semi-dwarf rice varieties CICA 4,6 and 9 were gaining acceptance in Belize.

Soyabean

Varietal trial undertaken in 1976 were unsuccessful. Results for the 1975 INTSOY trials can be seen in Appendix VI and VII. The highest yielding variety was Tracy (1300 Kg/ha), and Improved Pelican yielded the lowest. The number of pods per plant were far below the optimum (50 pods per plant). Oil content was 22% and protein content 42%.

2.3 Animal Production and Animal Breeding

The long awaited artificial insemination programme started in January of 1976, with the use of imported frozen semen. The programme was extended to Richmond Hill in Orange Walk, and to farmers. Efforts to expose the farmers to this programme were in the form of bulletins and Radio Talks. Conception rates were about 70% and should increase as the inseminators gain experience.

The year saw the establishment of the Animal Feeds Research programme. Work will initially be done with poultry and pig feedstuffs from locally

imported from U.S.A. From the progenies stocks should be made available for local demand.

Sheep

A small flock of Barbados Black/Sheep were donated by Heifer Project Belly International.

Pastures and Feeds

Pastures, which were almost destroyed by 1975 drought, were renovated. Sugar cane and Marker grass were used as supplement feed during the dry season. A trench was constructed and silage for 1977 was made.

A pilot experiment revealed that corn husk and cob meal produced better gains than chopped cane; but neither were recommended to fatten steers. Chopped sugar cane or corn husk and cob meal along with a protein supplement was recommended to feed breeding bulls, and chopped sugar cane used as a supplement feed on intensive dairying.

2.4 Agricultural Chemistry

Work was done mainly on training staff, selection of analytical techniques and consolidation of laboratory services. Requests made to DEV⁷/DIV for laboratory equipment including an Atomic Absorption Spectrophotometer were approved. In the meantime spectrophotometric techniques were adopted for manganese, zinc, copper, and molybdenum. Calcium and magnesium determinations by an EDTA method were started, as well as a turbidometric method for sulphur.

Fertilizers and Feedstuffs

The Agricultural Chemist was appointed Analyst under the Fertilizer and Feedstuff Ordinance and various samples of fertilizers and feedstuffs were sampled. Analysis did not deviate from declarations.

Fertilizer Trials

In May/June five fertilizer trials were established with corn in the Belize River Valley area. Only two were harvested due to premature harvesting by the owners, but tissues were collected from all five. The basic layout utilized 200 lbs per acre 10.30.10 with and without urea top dressing. In one trial banding of the fertilizer was compared to placement around the plant. No real benefits were obtained by band placement but an almost doubling of the yield occurred on round-the-plant placement. In the other trials levels of 10.30.10 from 100 lbs to 500 lbs/acre were compared; these were slight yield increases levelling out at 200 lbs/acre. No significant benefits occurred. Examinations of tissue in all trials indicated a number of mineral deficiencies which may have influenced responses to the NPK fertilizer (this was virtually pure).

In view of the general lack of response to fertilizer it was considered worthwhile investigating the sulphur status of Belize crops. A method for sulphur determination was adopted and analyses indicated a low status.

Pasture Analyses

A large backlog of pasture samples were cleared. Pasture mineral survey indicated varying deficiencies of all mineral nutrients with nitrogen and phosphorus of the major elements being consistently low.

A visit was made to Big Falls Rice Scheme in connection with a suspected nutritional disorder. This turned out to be an attack of

available products. The programme got underway with the construction of 3 poultry houses and obtaining necessary equipment for producing feeds.

General health of the cattle was very good in 1976. Mortality rates were slightly higher than in 1975 (4.25 vs 3.53), 50% of this were due to calves born weak. Brown Swiss Calves and weaner stock affected with anaplasmosis, piroplasmiasis and lungworm also contributed largely to the overall percentage. To minimize losses new pastures were established to replace swampy, helminth infected pastures. A cement holding pen was also constructed.

Revenue collected in 1976 was \$88,877.55. A total of \$46,657.65 was realized from sales of breeding heifers and replacement bulls, and \$33,849.50 from sales of slaughter stock. The Ministry discontinued sales of feeder stock within the year and these will either be fed out by the Livestock Development Division or used for experimental purposes.

Pure Brahman Herd

This herd, like in previous years, maintained satisfactory performance. Average birth weights, weaning weights, average daily gains can be seen in Appendix VIII, XII, and were similar to 1975 figures. Average weaning weights for both sexes were higher than in 1975 and even higher than the overall herd average. Birth rates (85%) increased by 9%.

Costa Rica Brahman

This herd was the nucleus for crossbreeding programs. The Charolais x Brahman Cross had the best performance. It had no advantage over the 3/4 Charolais x 1/4 Brahman, with respect to birth weights, weaning weights or average daily gains, but the 3/4 Charolais susceptibility to heat, diseases and endo- and ectoparasites. The Hereford x Brahman and Red Poll x Brahman crosses had high weaning weights and average daily gains. See Appendix IX, XI.

Red Poll

The demand for breeding stock was high but could be met. Weaning weights were greatly increased in 1976 with the sales of unproductive cows and cull heifers. This herd had higher weaning weights than the herd average, and it had the highest calving rates (93.9%). Money has been allocated for herd expansion in 1977.

Jamaican Black

The herd was transferred to Central Farm during the year, and the entire herd was sold due to poor productivity.

Brown Swiss

The average milk production per cow per day was 15 lbs with a range of 9 to 35 lbs. Total milk production was 61,373 lbs. The herd consisted of 37 animals and an average of 13 cows were in the milking line. The herd was fed chopped cane between milkings as supplementary feed.

Routine spraying was undertaken and tuberculosis and brucellosis testing showed no positive reactors. Positive cases of mastitis were identified and treated. All breeding was done by artificial insemination.

Pigs

The Ministry could not meet the high demand for breeding stock. A total of 51 pigs including Hampshire, Duroc and Large White breeds were

Helminthosporium, leaf spot probably aggravated by low zinc levels.

Analyses completed in 1976

<u>Soil</u>		<u>Plant Tissue</u>	
pH	272	N	469
Lime requirement	2	P	504
Ca CO ₃	44	K	517
F	269	Ca	226
K	269	Mg	226
Available Mg	2	S	8
C	2	Na	209
N	7	Zn	192
Organic Carbon	5	Cu	190
Water Holding Capacity	5		
	877		2,545
		Feedstuffs	30
		Miscellaneous	30
		Total	3,491

2.5 Agricultural Extension

The Ministry's extension was organized with a nucleus in Central Farm and branches in each District with individual extension officers available to farmers in specific zones within a District.

" In Central Farm, in-service training for new Extension Officers got underway with one month of introductory courses in general agriculture and 2 weeks attachment with both the Livestock Division and Banana Industry.

Several short courses and field days were organized for farmer training. The Ministry also participated in developing a Rural Education programme towards Youth training. Extension bulletins, booklets and leaflets on relevant agricultural topics were published, and the weekly Agricultural radio programme 'Farming for Progress' continued to be broadcasted. A weekly agricultural programme in Spanish was started in August, and throughout the year spot announcements on crop and livestock were given.

At the District level extension officers rendered advice to farmers and conducted meetings seminars, lectures, farm tours, results and method demonstrations etc.

The National Agricultural Show was held in Belmopan on 23 and 24th May. Some 13,000 people attended the two-days show and farmers from all over the country competed for the many prizes, ribbons and trophies offered for the crop and livestock exhibits. There were various other attractions including a rodeo and displays by the Band of the Second Battalion, The Queen's Regiment.

2.6 Mechanical Services

The Mechanical Division of the Ministry offered mechanical services to farmers as well as to the Department. Demands for the land clearing unit and the land preparation Unit increased. New workshops were completed at Central Farm and San Roman. The well rig units were not operating satisfactorily, only one unit worked for 9 months, the remaining four units

were not functional.

Services rendered during 1976 included:

Land Clearing and Rone Ploughing	1279 1/2	acres
Bushing and Windrowing	500	acres
Bush Logging	2353	acres
Ploughing	1260	acres
Harrowing	1625	acres
Harvesting	468	acres
Planting (including rice)	1132	acres
Fertilizing	160	acres

Other jobs included road building, pond digging, rotovating, spraying etc. The Mechanical Division was also responsible for servicing all vehicles and implements belonging to the Department:

APPENDIX I

MONTHLY RAINFALL AT VARIOUS STATIONS, 1976 (INCHES)

S Month/Station	Landivar	Belize International Airport	Stann Creek Agstat	Melinda Forest Station	Augustine	Central Farm	Toledo Agstat	Belmopan
January	6.58	4.02	8.80	9.11	7.34	5.96	6.90	6.73
February	1.59	2.87	1.95	1.13	4.61	5.13	1.65	3.87
March	1.51	0.26	0.56	0.42	-	-	2.25	0.24
April	0.58	0.71	0.09	0.13	-	0.11	1.14	-
May	5.38	3.57	2.47	3.10	2.36	4.22	6.82	1.58
June	18.30	26.22	30.45	27.88	16.91	15.29	21.13	26.36
July	0.37	0.48	2.92	2.27	6.98	9.20	22.36	7.00
August	4.69	8.22	7.08	7.38	10.03	6.10	18.10	8.08
September	8.28	12.44	13.64	22.51	6.77	4.60	12.59	7.55
October	4.11	4.16	5.32	6.49	7.06	3.03	5.67	2.83
November	11.92	8.49	11.23	9.71	5.31	5.84	10.19	5.93
December	17.07	14.99	16.57	13.52	13.24	10.96	9.78	13.72

APPENDIX II

MEAN MONTHLY MAXIMUM TEMPERATURE, 1976 (°F)

Month/Station	Londivar	Belize International Airport	Stann Creek Agstat	Melinda Forest Station	Augustine	Central Farm	Toledo Agstat	Belmopan
January	79	79	95	75	75	83	-	78
February	81	81	95	77	78	84	-	81
March	86	85	97	82	86	87	-	88
April	86	87	92	84	88	89	85	91
May	88	89	88	87	89	92	86	94
June	85	85	87	85	85	88	84	87
July	83	87	86	86	85	88	84	88
August	88	89	89	89	85	88	83	89
September	88	87	86	88	85	88	84	88
October	86	87	84	89	84	88	86	88
November	83	83	86	83	83	85	84	83
December	80	81	85	84	81	80	83	80

APPENDIX III

MEAN MONTHLY MINIMUM TEMPERATURES, 1976 (°F)

Month/Station	Landover	Belize International Airport	Stann Creek Agstat	Melinda Forest Station	Augustine	Central Farm	Toledo Agstat	Belmopan
January	67	66	73	64	59	63	-	58
February	67	65	70	61	58	61	-	59
March	75	72	77	67	63	63	-	61
April	75	71	74	67	62	62	67	62
May	77	75	80	72	65	69	71	70
June	75	75	80	73	68	72	72	71
July	74	77	80	74	73	72	72	71
August	76	74	80	72	72	70	70	69
September	76	74	79	73	64	-	-	70
October	75	73	74	77	62	69	71	69
November	71	70	75	69	63	56	69	66
December	69	69	74	72	58	66	68	66

APPENDIX IV

MEAN MONTHLY RELATIVE HUMIDITY

Month/Station	Belize Airport	Stann Creek Agstat	Melinda Forest Station	Svannah	Cooma Cairn	Augustine
January	83	87	82	80	83	86
February	77	82	78	76	82	79
March	72	95	74	69	69	62
April	77	91	71	64	66	60
May	76	92	72	66	63	66
June	86	93	81	80	81	77
July	79	94	76	77	73	76
August	81	85	73	75	76	82
September	85	80	77	79	81	79
October	84	85	71	76	83	80
November	86	92	80	77	87	83
December	88	90	85	85	91	85

APPENDIX V

SLAUGHTER STATISTICS 1976

PIGS

CATTLE

Month	Number	Dressed Weight Pounds	Average Dressed Weight Pounds	Number	Dressed Weight	Average Dressed Weight
January	478	156,559	353.3	381	37,130	97.5
February	531	172,335	324.5	271	24,636	90.9
March	559	182,536	326.6	295	27,228	92.3
April	599	202,982	338.9	325	28,423	87.5
May	476	161,602	339.5	270	18,252	67.6
June	425	149,313	351.3	400	31,909	79.8
July	515	176,866	343.4	323	27,283	84.5
August	301	99,810	331.6	298	27,672	92.9
September	303	104,018	343.3	250	26,844	107.4
October	280	91,788	327.8	274	26,727	97.5
November	356	122,915	345.3	515	44,746	86.9
December	480	187,157	389.9	393	36,479	92.8
	809	270,982		168		89.2
	6,112	2,078,857	340.1	4,163	13,988	-

APPENDIX VI

YIELD AND OTHER CHARACTERISTICS OF SOY. BEAN VARIETIES TESTED AT

CENTRAL FARM, IITSOY 1975

Variety	Yield (kg/ha)	Days to Flower	Days to Maturity	Plant Height (in)	Pods per Plant	100 Seed weight (gm)
Tracy	1,300	45	95	25	27	23
Forrest	1,178	43	91	27	24	21
Cobb	1,153	43	94	26	26	22
Semmes	1,147	44	91	25	21	22
Hampton 266A	1,137	44	93	28	16	21
Columbus	1,083	43	98	28	22	24
Woodworth	1,008	42	101	18	17	24
Williams	1,007	40	97	18	26	21
Davis	977	41	94	27	33	21
Callard	900	41	94	31	26	21
Hardee	718	44	93	24	25	21
Improved Pelican	530	43	94	25	18	23

APPENDIX VII

Oil and Protein percent on weight basis of soyabean

Varieties - Central Farm, Intsoy 1975

Variety	Oil %	Protein %
Jupiter	23.5	42.4
Hampton 266A	22.1	41.6
Hardee	20.6	44.8
Improved Pelican	21.6	43.4
Cabb	-	-
Bossier	21.8	42.9
Davis	22.2	42.3
Tracy	20.8	42.4
Forrest	20.1	44.2
Columbus	22.1	44.7
Clark 63	-	-
Woodworth	22.9	41.4
Williams	22.7	42.4
Calland	21.1	44.6
Semmes	19.8	45.9

APPENDIX VIII

COMPARISON OF AVERAGE BIRTH WEIGHTS OF DIFFERENT BREEDS

Breed	Number of Calves				Average Birth Weight		
	1974	1975	1976		1974	1975	1976
Costa Rican F	148	119	127		56.29	53.34	55.13
Costa Rican M	149	160	155		60.78	56.45	62.62
Red Poll F	9	14	14		60.22	65.29	70.50
Red Poll M	9	16	16		79.33	70.06	78.71
Pure Brahman F	14	11	12		55.00	53.60	57.50
Pure Brahman M	16	15	16		61.56	57.67	58.44
Brown Swiss F	5	7	10		87.80	74.11	87.60
Brown Swiss M	5	8	6		81.20	89.50	84.00

APPENDIX IX

COMPARISON OF AVERAGE BIRTH WEIGHTS OF DIFFERENT COSTS RICAN BRAHMAN CROSSES

Breeds	Number of Calves				Average Birth Weight		
	1974	1975	1976		1974	1975	1976
CR x Brahman F	91	108	104		54.10	51.20	56.60
CR x Brahman M	81	102	124		58.14	56.17	61.15
CR x Charolais F	21	26	9		65.23	61.23	69.22
CR x Charolais M	34	37	8		70.11	64.57	71.38
CR x Red Poll F	26	1	3		55.88	53.00	57.00
CR x Red Poll M	22	3	2		59.59	56.33	59.50
CR x Brown Swiss F	5	3	2		61.20	47.66	69.00
CR x Brown Swiss M	4	2	4		47.33	56.50	57.25
CR x Hereford F	-	6	3		-	53.60	52.00
CR x Hereford M	-	10	5		-	54.10	56.00
CR All Breeds F	148	144	127		56.29	54.34	55.13
CR All Breeds M	149	159	155		60.78	58.45	62.62

APPENDIX X

COMPARISON OF AVERAGE WEANING WEIGHTS OF DIFFERENT BREEDS

Breed	Number of Calves			Average Weaning Weights (Pounds)		
	1974	1975	1976	1974	1975	1976
CR Brahman F	180	146	112	363.60	348.60	386.97
CR Brahman M	174	158	125	393.12	379.30	430.93
Pure Red Poll F	17	12	14	357.17	319.62	417.50
Pure Red Poll M	16	15	11	329.00	360.33	499.18
Pure Brahman F	15	13	11	363.26	350.85	441.46
Pure Brahman M	13	14	15	428.92	405.64	457.87
Pure Brown Swiss F	5	6	6	371.80	245.84	318.83
Pure Brown Swiss M	6	7	4	406.83	311.14	311.25

Average for all Female on 143 head = 391.19 Pounds

Average for all Male on 155 head = 424.81 Pounds

APPENDIX VI

COMPARISON OF AVERAGE WEANING HEIGHTS OF DIFFERENT BREEDS

Breed	Number of Calves			Average Weaning Weights Pounds		
	1974	1974	1975	1974	1975	1976
Costa Rican x Brahman F	72		100	345.40	284.71	378.14
Costa Rican x Brahman M	51		103	365.77	368.41	407.41
CR x Red Poll F	34		7	353.17	323.57	411.00
CR x Red Poll M	36		6	392.88	359.33	423.50
CR x Charolais F	28		26	414.50	412.62	450.00
CR x Charolais M	30		37	450.57	432.35	516.00
$\frac{1}{2}$ Ch x Charolais F	-		-	-	-	483.25
$\frac{1}{2}$ Ch Charolais M	-		-	-	-	497.57
CR x Brown Swiss F	7		4	403.71	373.75	431.00
CR x Brown Swiss M	6		-	380.16	-	494.71
CR x Hereford F	17		9	366.17	348.17	378.00
CR x Hereford M	13		8	374.61	398.13	440.27
CR x All Breeds F	180		146	363.60	348.60	386.97
M	174		158	393.12	379.30	430.93
			Range (M)	230	-	609 Pounds
			Range (F)	228	-	545 Pounds
			Weaning Age	-	-	8 months

APPENDIX XII

BREAKDOWN OF DAILY GAIN - 1976

Breed	No. of Animals	Sex	Total Average Daily Gain (Pounds)	Range (Pounds)
Pure Brahman	115	F	1.03 pounds	0.71 - 1.33
Pure Brahman	22	M	1.11 pounds	0.64 - 1.55
Red Poll	16	F	1.06 pounds	0.76 - 1.66
Red Poll	16	M	1.12 pounds	0.73 - 1.66
Brown Swiss	9	F	0.61 pounds	0.33 - 0.75
Brown Swiss	6	M	0.64 pounds	0.47 - 0.83
Red Poll x Brahman	2	F	1.17 pounds	0.84 - 1.49
Red Poll x Brahman	5	M	1.21 pounds	0.97 - 1.43
Brown Swiss x Brahman	3	F	0.89 pounds	0.67 - 1.00
Brown Swiss x Brahman		M	1.14 pounds	0.72 - 1.71
Hereford x Brahman	4	F	1.29 pounds	0.81 - 1.64
Hereford x Brahman	16	M	1.09 pounds	0.91 - 1.33
$\frac{1}{2}$ Ch x Charbrais	8	F	1.11 pounds	0.65 - 1.62
$\frac{1}{2}$ Ch x Charbrais	12	M	1.17 pounds	0.62 - 1.61
Costa Rican x Brahman	97	F	1.16 pounds	0.60 - 1.50
Costa Rican x Brahman	124	M	1.07 pounds	0.57 - 1.67

APPENDIX XIII

COMPARISON OF CONCEPTION RATES OF DIFFERENT BREEDS

Breed	No. of Cows	No. Pregnant (Calf)	%
Pure Brahman	34	29	85.3
Costa Rican #2	100	85	85.0
Costa Rican #A1	111	97	87.3
Costa Rican #1	70	60	85.7
Charbrais	43	38	85.5
Brown Swiss	16	13	81.2
Red Poll	33	31	93.9

Total Average for 1976 - 86.3%

Range 1974	62 % to 85 %	Average	74 %
1975	65.7% to 86.7%		77.7%
1976	81.2% to 93.9%		86.3%

APPENDIX XIV

SOWS PRODUCTION RECORD

Breed	No. of Litters	Average No. of pigs born/litter	Average No. of pigs weaned/litter	Average Weaning Weight /litter
Large White	3	11	9.66	27.8
	3	9	8.33	44.0
	-	-	-	-
Land Race	1	13	(All died after parturition)	-
	-	-	-	-
	-	-	-	-
Duroc	3	8	6	29.3
	3	10	3.66	37.4
	2	-	4.50	39.0
Different crosses	5	7	6.75	36.8
	5	9	4.40	35.5
	3	11	9.66	43.1

